

Balancing Chemical Equations 化学方程式配平

One of the most useful devices for communicating information related to chemical changes is the chemical equation. The equation contains both qualitative and quantitative information related to the nature and quantity of the substances involved in the chemical reaction. It may also include the energy change involved.

Atoms are fundamental building blocks of all matter. For the purpose of equation balancing we say that they can be neither created nor destroyed. Thus the number of atoms at the beginning of a reaction (reactants - left side of the equation) must equal the number of atoms at the end of the reaction (products - right side of the equation). Note that the number of atoms on each side of an equation must balance, therefore, the mass (number of grams) must balance, but not the number of molecules nor the volume of gases.

The subscripts in a correct formula tell the number of atoms in one molecule. The coefficients (numbers in front of a formula) in a correctly balanced equation tell the number of molecules involved in a reaction.

There is a particular order that you can follow in balancing. It is the MINOH method (Me know chemistry, said Tarzan as he climbed the stoichiome-tree.)

M - metals. Balance metals such as Fe or Na first.

I - ions. Looks for polyatomic ions (such as PO_4^{-3} or SO_4^{-2} that cross from reactant to product unchanged. Balance them as a group.

N - non-metals. Look for Cl or S, these are common ones.

O - oxygen and then H - hydrogen.

Often, balancing H and O will involve water on one side or the other. Also, look carefully for elements which occur in only one place on each side of the arrow. These should be balanced before examining elements that are spread over several compounds. Often, either H or O will be spread out over several compounds. This is the one to leave to the last. Remember, you cannot change a subscript to balance the equation, nor can you add in new compounds.

化学方程式是表达化学反应相关信息最实用的形式。它能够体现出参与反应各物质的种类与数量，兼具定性和定量信息，也可标注反应过程中的能量变化。

原子是构成所有物质的基本微粒。配平化学方程式需遵循原子守恒原则：原子既不能被创造，也不会消失。因此，反应前（方程式左侧的反应物）的原子总数必须等于反应后（方程式右侧的生成物）的原子总数。请注意：方程式两侧原子总数、总质量（质量克数）一定守恒，但分子数目与气体体积不一定相等。

化学式中的下标表示一个分子中所含对应原子的个数；配平后的方程式里，化学式前方的系数代表参与反应的分子数目。

配平方程式可以按照固定顺序进行，该方法称为 MINOH 配平法。

M — 金属元素。先配平铁、钠等金属元素。

I — 离子。找出反应前后不变的原子团（如 PO_4^{-3} or SO_4^{-2} ），将原子团作为一个整体配平。

N — 非金属元素。接着配平氯、硫等常见非金属元素。

O — 氧元素，最后配平 H — 氢元素。

配平氢、氧时，反应式中常会出现水。优先配平在等式两侧只出现在一种物质中的元素，再处理分布在多种化合物中的元素。氢、氧通常分散在多种物质中，留到最后配平。切记：不可以修改化学式下标，也不能随意添加新物质来配平方程式。

Balancing Chemical Equations Worksheet 化学方程式配平练习题

1.	$\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$	
2.	$\text{S}_8 + \text{O}_2 \rightarrow \text{SO}_3$	
3.	$\text{HgO} \rightarrow \text{Hg} + \text{O}_2$	
4.	$\text{Zn} + \text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$	
5.	$\text{Na} + \text{H}_2\text{O} \rightarrow \text{NaOH} + \text{H}_2$	
6.	$\text{C}_{10}\text{H}_{16} + \text{Cl}_2 \rightarrow \text{C} + \text{HCl}$	
7.	$\text{Si}_2\text{H}_3 + \text{O}_2 \rightarrow \text{SiO}_2 + \text{H}_2\text{O}$	
8.	$\text{Fe} + \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3$	
9.	$\text{C}_7\text{H}_6\text{O}_2 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$	
10.	$\text{FeS}_2 + \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3 + \text{SO}_2$	
11.	$\text{Fe}_2\text{O}_3 + \text{H}_2 \rightarrow \text{Fe} + \text{H}_2\text{O}$	
12.	$\text{K} + \text{Br}_2 \rightarrow \text{KBr}$	
13.	$\text{C}_2\text{H}_2 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$	
14.	$\text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{O} + \text{O}_2$	
15.	$\text{C}_7\text{H}_{16} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$	
16.	$\text{SiO}_2 + \text{HF} \rightarrow \text{SiF}_4 + \text{H}_2\text{O}$	
17.	$\text{KClO}_3 \rightarrow \text{KCl} + \text{O}_2$	
18.	$\text{KClO}_3 \rightarrow \text{KClO}_4 + \text{KCl}$	
19.	$\text{P}_4\text{O}_{10} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{PO}_4$	
20.	$\text{Sb} + \text{O}_2 \rightarrow \text{Sb}_4\text{O}_6$	
21.	$\text{C}_3\text{H}_8 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$	
22.	$\text{Fe}_2\text{O}_3 + \text{CO} \rightarrow \text{Fe} + \text{CO}_2$	
23.	$\text{PCl}_5 + \text{H}_2\text{O} \rightarrow \text{HCl} + \text{H}_3\text{PO}_4$	
24.	$\text{H}_2\text{S} + \text{Cl}_2 \rightarrow \text{S}_8 + \text{HCl}$	
25.	$\text{Fe} + \text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + \text{H}_2$	
26.	$\text{N}_2 + \text{H}_2 \rightarrow \text{NH}_3$	
27.	$\text{N}_2 + \text{O}_2 \rightarrow \text{N}_2\text{O}$	
28.	$\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$	
29.	$\text{SiCl}_4 + \text{H}_2\text{O} \rightarrow \text{H}_4\text{SiO}_4 + \text{HCl}$	
30.	$\text{H}_3\text{PO}_4 \rightarrow \text{H}_4\text{P}_2\text{O}_7 + \text{H}_2\text{O}$	
31.	$\text{CO}_2 + \text{NH}_3 \rightarrow \text{OC}(\text{NH}_2)_2 + \text{H}_2\text{O}$	
32.	$\text{Al}(\text{OH})_3 + \text{H}_2\text{SO}_4 \rightarrow \text{Al}_2(\text{SO}_4)_3 + \text{H}_2\text{O}$	
33.	$\text{Fe}_2(\text{SO}_4)_3 + \text{KOH} \rightarrow \text{K}_2\text{SO}_4 + \text{Fe}(\text{OH})_3$	
34.	$\text{H}_2\text{SO}_4 + \text{HI} \rightarrow \text{H}_2\text{S} + \text{I}_2 + \text{H}_2\text{O}$	

35.	$\text{Al} + \text{FeO} \rightarrow \text{Al}_2\text{O}_3 + \text{Fe}$	
36.	$\text{Na}_2\text{CO}_3 + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O} + \text{CO}_2$	
37.	$\text{P}_4 + \text{O}_2 \rightarrow \text{P}_2\text{O}_5$	
38.	$\text{K}_2\text{O} + \text{H}_2\text{O} \rightarrow \text{KOH}$	
39.	$\text{Al} + \text{O}_2 \rightarrow \text{Al}_2\text{O}_3$	
40.	$\text{Na}_2\text{O}_2 + \text{H}_2\text{O} \rightarrow \text{NaOH} + \text{O}_2$	
41.	$\text{C} + \text{H}_2\text{O} \rightarrow \text{CO} + \text{H}_2$	
42.	$\text{H}_3\text{AsO}_4 \rightarrow \text{As}_2\text{O}_5 + \text{H}_2\text{O}$	
43.	$\text{Al}_2(\text{SO}_4)_3 + \text{Ca}(\text{OH})_2 \rightarrow \text{Al}(\text{OH})_3 + \text{CaSO}_4$	
44.	$\text{FeCl}_3 + \text{NH}_4\text{OH} \rightarrow \text{Fe}(\text{OH})_3 + \text{NH}_4\text{Cl}$	
45.	$\text{Ca}_3(\text{PO}_4)_2 + 6\text{SiO}_2 \rightarrow \text{P}_4\text{O}_{10} + \text{CaSiO}_3$	
46.	$\text{N}_2\text{O}_5 + \text{H}_2\text{O} \rightarrow \text{HNO}_3$	
47.	$\text{Al} + \text{HCl} \rightarrow \text{AlCl}_3 + \text{H}_2$	
48.	$\text{H}_3\text{BO}_3 \rightarrow \text{H}_4\text{B}_6\text{O}_{11} + \text{H}_2\text{O}$	
49.	$\text{Mg} + \text{N}_2 \rightarrow \text{Mg}_3\text{N}_2$	
50.	$\text{NaOH} + \text{Cl}_2 \rightarrow \text{NaCl} + \text{NaClO} + \text{H}_2\text{O}$	
51.	$\text{Li}_2\text{O} + \text{H}_2\text{O} \rightarrow \text{LiOH}$	
52.	$\text{CaC}_2 + \text{H}_2\text{O} \rightarrow \text{C}_2\text{H}_2 + \text{Ca}(\text{OH})_2$	
53.	$\text{Fe}(\text{OH})_3 \rightarrow \text{Fe}_2\text{O}_3 + \text{H}_2\text{O}$	
54.	$\text{Pb}(\text{NO}_3)_2 \rightarrow \text{PbO} + \text{NO}_2 + \text{O}_2$	
55.	$\text{BaO} + \text{H}_2\text{O} \rightarrow \text{Ba}(\text{OH})_2$	
56.	$\text{Ca} + \text{AlCl}_3 \rightarrow \text{CaCl}_2 + \text{Al}$	
57.	$\text{NH}_3 + \text{NO} \rightarrow \text{N}_2 + \text{H}_2\text{O}$	
58.	$\text{H}_3\text{PO}_3 \rightarrow \text{H}_3\text{PO}_4 + \text{PH}_3$	
59.	$\text{Fe}_2\text{O}_3 + \text{C} \rightarrow \text{CO} + \text{Fe}$	
60.	$\text{FeS} + \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3 + \text{SO}_2$	
61.	$\text{NH}_3 + \text{O}_2 \rightarrow \text{NO} + \text{H}_2\text{O}$	
62.	$\text{Si} + \text{S}_8 \rightarrow \text{Si}_2\text{S}_4$	
63.	$\text{Hg}_2\text{CO}_3 \rightarrow \text{Hg} + \text{HgO} + \text{CO}_2$	
64.	$\text{SiC} + \text{Cl}_2 \rightarrow \text{SiCl}_4 + \text{C}$	
65.	$\text{Al}_4\text{C}_3 + \text{H}_2\text{O} \rightarrow \text{CH}_4 + \text{Al}(\text{OH})_3$	
66.	$\text{V}_2\text{O}_5 + \text{HCl} \rightarrow \text{VOCl}_3 + \text{H}_2\text{O}$	
67.	$\text{Ag}_2\text{S} + \text{KCN} \rightarrow \text{KAg}(\text{CN})_2 + \text{K}_2\text{S}$	
68.	$\text{Au}_2\text{S}_3 + \text{H}_2 \rightarrow \text{Au} + \text{H}_2\text{S}$	
69.	$\text{ClO}_2 + \text{H}_2\text{O} \rightarrow \text{HClO}_2 + \text{HClO}_3$	
70.	$\text{KO}_2 + \text{CO}_2 \rightarrow \text{K}_2\text{CO}_3 + \text{O}_2$	
71.	$\text{MgNH}_4\text{PO}_4 \rightarrow \text{Mg}_2\text{P}_2\text{O}_7 + \text{NH}_3 + \text{H}_2\text{O}$	
72.	$\text{MnO}_2 + \text{HCl} \rightarrow \text{MnCl}_2 + \text{H}_2\text{O} + \text{Cl}_2$	
73.	$\text{Pb} + \text{Na} + \text{C}_2\text{H}_5\text{Cl} \rightarrow \text{Pb}(\text{C}_2\text{H}_5)_4 + \text{NaCl}$	
74.	$\text{Ca}(\text{OH})_2 + \text{H}_3\text{PO}_4 \rightarrow \text{CaHPO}_4 + \text{H}_2\text{O}$	
75.	$\text{Zn} + \text{NaOH} + \text{H}_2\text{O} \rightarrow \text{Na}_2\text{Zn}(\text{OH})_4 + \text{H}_2$	

76.	$\text{SrBr}_2 + (\text{NH}_4)_2\text{CO}_3 \rightarrow \text{SrCO}_3 + \text{NH}_4\text{Br}$	
77.	$\text{Hg}(\text{OH})_2 + \text{H}_3\text{PO}_4 \rightarrow \text{Hg}_3(\text{PO}_4)_2 + \text{H}_2\text{O}$	
78.	$\text{Ca}_3(\text{PO}_4)_2 + \text{SiO}_2 + \text{C} \rightarrow \text{CaSiO}_3 + \text{P}_4 + \text{CO}$	
79.	$\text{I}_4\text{O}_9 \rightarrow \text{I}_2\text{O}_6 + \text{I}_2 + \text{O}_2$ (该方程式可使用多组系数配平)	(this equation can be balanced with various sets of coefficients)
80.	$\text{C}_2\text{H}_3\text{Cl} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} + \text{HCl}$	
81.	$(\text{NH}_4)_2\text{Cr}_2\text{O}_7 \rightarrow \text{NH}_3 + \text{H}_2\text{O} + \text{Cr}_2\text{O}_3 + \text{O}_2$	
82.	$\text{Al} + \text{NaOH} + \text{H}_2\text{O} \rightarrow \text{NaAl}(\text{OH})_4 + \text{H}_2$	
83.	$\text{NH}_4\text{Cl} + \text{Ca}(\text{OH})_2 \rightarrow \text{CaCl}_2 + \text{NH}_3 + \text{H}_2\text{O}$	
84.	$\text{Al} + \text{NH}_4\text{ClO}_4 \rightarrow \text{Al}_2\text{O}_3 + \text{AlCl}_3 + \text{NO} + \text{H}_2\text{O}$	
85.	$\text{H}_2\text{SO}_4 + \text{NaHCO}_3 \rightarrow \text{Na}_2\text{SO}_4 + \text{CO}_2 + \text{H}_2\text{O}$	
86.	$\text{Ca}_{10}\text{F}_2(\text{PO}_4)_6 + \text{H}_2\text{SO}_4 \rightarrow \text{Ca}(\text{H}_2\text{PO}_4)_2 + \text{CaSO}_4 + \text{HF}$	
87.	$\text{Ca}_3(\text{PO}_4)_2 + \text{H}_2\text{SO}_4 \rightarrow \text{CaSO}_4 + \text{Ca}(\text{H}_2\text{PO}_4)_2$	
88.	$\text{H}_3\text{PO}_4 + (\text{NH}_4)_2\text{MoO}_4 + \text{HNO}_3 \rightarrow (\text{NH}_4)_3\text{PO}_4 \cdot 12\text{MoO}_3 + \text{NH}_4\text{NO}_3 + \text{H}_2\text{O}$	
89.	$\text{C}_4\text{H}_{10} + \text{Cl}_2 + \text{O}_2 \rightarrow \text{CO}_2 + \text{CCl}_4 + \text{H}_2\text{O}$	
90.	$\text{C}_7\text{H}_{10}\text{N} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} + \text{NO}_2$	
91.	$\text{H}_3\text{PO}_4 + \text{HCl} \rightarrow \text{PCl}_5 + \text{H}_2\text{O}$	
92.	$\text{HCl} + \text{K}_2\text{CO}_3 \rightarrow \text{KCl} + \text{H}_2\text{O} + \text{CO}$	
93.	$\text{Ca}(\text{ClO}_3)_2 \rightarrow \text{CaCl}_2 + \text{O}_2$	
94.	$\text{C}_2\text{H}_5\text{OH} + \text{O}_2 \rightarrow \text{CO} + \text{H}_2\text{O}$	
95.	$\text{Xe} + \text{F}_2 \rightarrow \text{XeF}_6$	
96.	$\text{NH}_4\text{NO}_3 \rightarrow \text{N}_2\text{O} + \text{H}_2\text{O}$	
97.	$\text{Au}_2\text{O}_3 \rightarrow \text{Au} + \text{O}_2$	
98.	$\text{C}_4\text{H}_{10} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$	
99.	$\text{Fe}_3\text{O}_4 + \text{H}_2 \rightarrow \text{Fe} + \text{H}_2\text{O}$	
100.	$\text{O}_2 \rightarrow \text{O}_3$	
101.	$\text{I}_2 + \text{HNO}_3 \rightarrow \text{HIO}_3 + \text{NO}_2 + \text{H}_2$	
102.	$\text{C}_6\text{H}_6 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$	
103.	$\text{C}_2\text{H}_5\text{OH} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$	
104.	$\text{HClO}_4 + \text{P}_4\text{O}_{10} \rightarrow \text{H}_3\text{PO}_4 + \text{Cl}_2\text{O}_7$	
105.	$\text{BaCl}_2 + \text{Al}_2(\text{SO}_4)_3 \rightarrow \text{BaSO}_4 + \text{AlCl}_3$	
106.	$(\text{NH}_4)_2\text{Cr}_2\text{O}_7 \rightarrow \text{Cr}_2\text{O}_3 + \text{N}_2 + \text{H}_2\text{O}$	
107.	$\text{NaHCO}_3 \rightarrow \text{Na}_2\text{CO}_3 + \text{CO}_2 + \text{H}_2\text{O}$	
108.	$\text{Fe}_2(\text{C}_2\text{O}_4)_3 \rightarrow \text{FeC}_2\text{O}_4 + \text{CO}_2$	
109.	$\text{Ca}_3\text{P}_2 + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2 + \text{PH}_3$	
110.	$\text{As} + \text{NaOH} \rightarrow \text{Na}_3\text{AsO}_3 + \text{H}_2$	

*** End ***

**Answers of
Balanced Chemical Equations**

1. $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
2. $2\text{S}_8 + 24\text{O}_2 \rightarrow 16\text{SO}_3$
3. $2\text{HgO} \rightarrow 2\text{Hg} + \text{O}_2$
4. $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$
5. $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$
6. $\text{C}_{10}\text{H}_{16} + 8\text{Cl}_2 \rightarrow 10\text{C} + 16\text{HCl}$
7. $4\text{Si}_2\text{H}_3 + 11\text{O}_2 \rightarrow 8\text{SiO}_2 + 6\text{H}_2\text{O}$
8. $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$
9. $2\text{C}_7\text{H}_6\text{O}_2 + 15\text{O}_2 \rightarrow 14\text{CO}_2 + 6\text{H}_2\text{O}$
10. $4\text{FeS}_2 + 11\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3 + 8\text{SO}_2$
11. $\text{Fe}_2\text{O}_3 + 3\text{H}_2 \rightarrow 2\text{Fe} + 3\text{H}_2\text{O}$
12. $2\text{K} + \text{Br}_2 \rightarrow 2\text{KBr}$
13. $2\text{C}_2\text{H}_2 + 5\text{O}_2 \rightarrow 4\text{CO}_2 + 2\text{H}_2\text{O}$
14. $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$
15. $2\text{C}_7\text{H}_{16} + 21\text{O}_2 \rightarrow 14\text{CO}_2 + 16\text{H}_2\text{O}$
16. $\text{SiO}_2 + 4\text{HF} \rightarrow \text{SiF}_4 + 2\text{H}_2\text{O}$
17. $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$
18. $4\text{KClO}_3 \rightarrow 3\text{KClO}_4 + \text{KCl}$
19. $\text{P}_4\text{O}_{10} + 6\text{H}_2\text{O} \rightarrow 4\text{H}_3\text{PO}_4$
20. $4\text{Sb} + 3\text{O}_2 \rightarrow \text{Sb}_4\text{O}_6$
21. $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$
22. $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$
23. $\text{PCl}_5 + 4\text{H}_2\text{O} \rightarrow 5\text{HCl} + \text{H}_3\text{PO}_4$
24. $8\text{H}_2\text{S} + 4\text{Cl}_2 \rightarrow \text{S}_8 + 8\text{HCl}$
25. $3\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$
26. $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$
27. $2\text{N}_2 + \text{O}_2 \rightarrow 2\text{N}_2\text{O}$
28. $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
29. $\text{SiCl}_4 + 4\text{H}_2\text{O} \rightarrow \text{H}_4\text{SiO}_4 + 4\text{HCl}$
30. $2\text{H}_3\text{PO}_4 \rightarrow \text{H}_4\text{P}_2\text{O}_7 + \text{H}_2\text{O}$
31. $\text{CO}_2 + 2\text{NH}_3 \rightarrow \text{OC}(\text{NH}_2)_2 + \text{H}_2\text{O}$
32. $2\text{Al}(\text{OH})_3 + 3\text{H}_2\text{SO}_4 \rightarrow \text{Al}_2(\text{SO}_4)_3 + 6\text{H}_2\text{O}$
33. $\text{Fe}_2(\text{SO}_4)_3 + 6\text{KOH} \rightarrow 3\text{K}_2\text{SO}_4 + 2\text{Fe}(\text{OH})_3$
34. $4\text{H}_2\text{SO}_4 + 8\text{HI} \rightarrow \text{H}_2\text{S} + 4\text{I}_2 + 4\text{H}_2\text{O}$
35. $2\text{Al} + 3\text{FeO} \rightarrow \text{Al}_2\text{O}_3 + 3\text{Fe}$
36. $\text{Na}_2\text{CO}_3 + 2\text{HCl} \rightarrow 2\text{NaCl} + \text{H}_2\text{O} + \text{CO}_2$
37. $4\text{P} + 5\text{O}_2 \rightarrow 2\text{P}_2\text{O}_5$
38. $\text{K}_2\text{O} + \text{H}_2\text{O} \rightarrow 2\text{KOH}$
39. $4\text{Al} + 3\text{O}_2 \rightarrow 2\text{Al}_2\text{O}_3$
40. $2\text{Na}_2\text{O}_2 + 2\text{H}_2\text{O} \rightarrow 4\text{NaOH} + \text{O}_2$
41. $\text{C} + \text{H}_2\text{O} \rightarrow \text{CO} + \text{H}_2$
42. $2\text{H}_3\text{AsO}_4 \rightarrow \text{As}_2\text{O}_5 + 3\text{H}_2\text{O}$

43. $\text{Al}_2(\text{SO}_4)_3 + 3\text{Ca}(\text{OH})_2 \rightarrow 2\text{Al}(\text{OH})_3 + 3\text{CaSO}_4$
44. $\text{FeCl}_3 + 3\text{NH}_4\text{OH} \rightarrow \text{Fe}(\text{OH})_3 + 3\text{NH}_4\text{Cl}$
45. $2\text{Ca}_3(\text{PO}_4)_2 + 6\text{SiO}_2 \rightarrow \text{P}_4\text{O}_{10} + 6\text{CaSiO}_3$
46. $\text{N}_2\text{O}_5 + \text{H}_2\text{O} \rightarrow 2\text{HNO}_3$
47. $2\text{Al} + 6\text{HCl} \rightarrow 2\text{AlCl}_3 + 3\text{H}_2$
48. $6\text{H}_3\text{BO}_3 \rightarrow \text{H}_4\text{B}_6\text{O}_{11} + 7\text{H}_2\text{O}$
49. $3\text{Mg} + \text{N}_2 \rightarrow \text{Mg}_3\text{N}_2$
50. $2\text{NaOH} + \text{Cl}_2 \rightarrow \text{NaCl} + \text{NaClO} + \text{H}_2\text{O}$
51. $\text{Li}_2\text{O} + \text{H}_2\text{O} \rightarrow 2\text{LiOH}$
52. $\text{CaC}_2 + 2\text{H}_2\text{O} \rightarrow \text{C}_2\text{H}_2 + \text{Ca}(\text{OH})_2$
53. $2\text{Fe}(\text{OH})_3 \rightarrow \text{Fe}_2\text{O}_3 + 3\text{H}_2\text{O}$
54. $2\text{Pb}(\text{NO}_3)_2 \rightarrow 2\text{PbO} + 4\text{NO}_2 + \text{O}_2$
55. $\text{BaO} + \text{H}_2\text{O} \rightarrow \text{Ba}(\text{OH})_2$
56. $3\text{Ca} + 2\text{AlCl}_3 \rightarrow 3\text{CaCl}_2 + 2\text{Al}$
57. $4\text{NH}_3 + 6\text{NO} \rightarrow 5\text{N}_2 + 6\text{H}_2\text{O}$
58. $4\text{H}_3\text{PO}_3 \rightarrow 3\text{H}_3\text{PO}_4 + \text{PH}_3$
59. $\text{Fe}_2\text{O}_3 + 3\text{C} \rightarrow 2\text{Fe} + 3\text{CO}$
60. $4\text{FeS} + 7\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3 + 4\text{SO}_2$
61. $4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O}$
62. $2\text{Si} + \text{S}_8 \rightarrow \text{Si}_2\text{S}_4$
63. $\text{Hg}_2\text{CO}_3 \rightarrow \text{Hg} + \text{HgO} + \text{CO}_2$
64. $\text{SiC} + 2\text{Cl}_2 \rightarrow \text{SiCl}_4 + \text{C}$
65. $\text{Al}_4\text{C}_3 + 12\text{H}_2\text{O} \rightarrow 3\text{CH}_4 + 4\text{Al}(\text{OH})_3$
66. $\text{V}_2\text{O}_5 + 6\text{HCl} \rightarrow 2\text{VOCl}_3 + 3\text{H}_2\text{O}$
67. $\text{Ag}_2\text{S} + 4\text{KCN} \rightarrow 2\text{KAg}(\text{CN})_2 + \text{K}_2\text{S}$
68. $\text{Au}_2\text{S}_3 + 3\text{H}_2 \rightarrow 2\text{Au} + 3\text{H}_2\text{S}$
69. $4\text{ClO}_2 + 2\text{H}_2\text{O} \rightarrow 2\text{HClO}_2 + 2\text{HClO}_3 + \text{O}_2$
70. $4\text{KO}_2 + 2\text{CO}_2 \rightarrow 2\text{K}_2\text{CO}_3 + 3\text{O}_2$
71. $2\text{MgNH}_4\text{PO}_4 \rightarrow \text{Mg}_2\text{P}_2\text{O}_7 + 2\text{NH}_3 + \text{H}_2\text{O}$
72. $\text{MnO}_2 + 4\text{HCl} \rightarrow \text{MnCl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2$
73. $2\text{Pb} + 8\text{Na} + 4\text{C}_2\text{H}_5\text{Cl} \rightarrow \text{Pb}(\text{C}_2\text{H}_5)_4 + 8\text{NaCl}$
74. $\text{Ca}(\text{OH})_2 + \text{H}_3\text{PO}_4 \rightarrow \text{CaHPO}_4 + 2\text{H}_2\text{O}$
75. $\text{Zn} + 2\text{NaOH} + 2\text{H}_2\text{O} \rightarrow \text{Na}_2\text{Zn}(\text{OH})_4 + \text{H}_2$
76. $\text{SrBr}_2 + (\text{NH}_4)_2\text{CO}_3 \rightarrow \text{SrCO}_3 + 2\text{NH}_4\text{Br}$
77. $3\text{Hg}(\text{OH})_2 + 2\text{H}_3\text{PO}_4 \rightarrow \text{Hg}_3(\text{PO}_4)_2 + 6\text{H}_2\text{O}$
78. $2\text{Ca}_3(\text{PO}_4)_2 + 6\text{SiO}_2 + 10\text{C} \rightarrow 6\text{CaSiO}_3 + \text{P}_4 + 10\text{CO}$
79. $4\text{I}_4\text{O}_9 \rightarrow 6\text{I}_2\text{O}_6 + \text{I}_2 + 3\text{O}_2$
80. $2\text{C}_2\text{H}_3\text{Cl} + 5\text{O}_2 \rightarrow 4\text{CO}_2 + 2\text{H}_2\text{O} + 2\text{HCl}$
81. $4(\text{NH}_4)_2\text{Cr}_2\text{O}_7 \rightarrow 8\text{NH}_3 + 4\text{H}_2\text{O} + 4\text{Cr}_2\text{O}_3 + 3\text{O}_2$
82. $2\text{Al} + 2\text{NaOH} + 6\text{H}_2\text{O} \rightarrow 2\text{NaAl}(\text{OH})_4 + 3\text{H}_2$
83. $2\text{NH}_4\text{Cl} + \text{Ca}(\text{OH})_2 \rightarrow \text{CaCl}_2 + 2\text{NH}_3 + 2\text{H}_2\text{O}$
84. $3\text{Al} + 3\text{NH}_4\text{ClO}_4 \rightarrow \text{Al}_2\text{O}_3 + \text{AlCl}_3 + 3\text{NO} + 6\text{H}_2\text{O}$
85. $\text{H}_2\text{SO}_4 + 2\text{NaHCO}_3 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{CO}_2 + 2\text{H}_2\text{O}$
86. $\text{Ca}_{10}\text{F}_2(\text{PO}_4)_6 + 7\text{H}_2\text{SO}_4 \rightarrow 3\text{Ca}(\text{H}_2\text{PO}_4)_2 + 7\text{CaSO}_4 + 2\text{HF}$
87. $\text{Ca}_3(\text{PO}_4)_2 + 2\text{H}_2\text{SO}_4 \rightarrow 2\text{CaSO}_4 + \text{Ca}(\text{H}_2\text{PO}_4)_2$

88. $\text{H}_3\text{PO}_4 + 12(\text{NH}_4)_2\text{MoO}_4 + 21\text{HNO}_3 \rightarrow (\text{NH}_4)_3\text{PO}_4 \cdot 12\text{MoO}_3 + 21\text{NH}_4\text{NO}_3 + 12\text{H}_2\text{O}$
89. $2\text{C}_4\text{H}_{10} + 9\text{Cl}_2 + 4\text{O}_2 \rightarrow 4\text{CO}_2 + 2\text{CCl}_4 + 10\text{H}_2\text{O}$
90. $4\text{C}_7\text{H}_{10}\text{N} + 43\text{O}_2 \rightarrow 28\text{CO}_2 + 20\text{H}_2\text{O} + 4\text{NO}_2$
91. $\text{H}_3\text{PO}_4 + 5\text{HCl} \rightarrow \text{PCl}_5 + 4\text{H}_2\text{O}$
92. $2\text{HCl} + \text{K}_2\text{CO}_3 \rightarrow 2\text{KCl} + \text{H}_2\text{O} + \text{CO}$
93. $\text{Ca}(\text{ClO}_3)_2 \rightarrow \text{CaCl}_2 + 3\text{O}_2$
94. $2\text{C}_2\text{H}_5\text{OH} + 3\text{O}_2 \rightarrow 4\text{CO} + 6\text{H}_2\text{O}$
95. $\text{Xe} + 3\text{F}_2 \rightarrow \text{XeF}_6$
96. $\text{NH}_4\text{NO}_3 \rightarrow \text{N}_2\text{O} + 2\text{H}_2\text{O}$
97. $2\text{Au}_2\text{O}_3 \rightarrow 4\text{Au} + 3\text{O}_2$
98. $2\text{C}_4\text{H}_{10} + 13\text{O}_2 \rightarrow 8\text{CO}_2 + 10\text{H}_2\text{O}$
99. $\text{Fe}_3\text{O}_4 + 4\text{H}_2 \rightarrow 3\text{Fe} + 4\text{H}_2\text{O}$
100. $3\text{O}_2 \rightarrow 2\text{O}_3$
101. $3\text{I}_2 + 10\text{HNO}_3 \rightarrow 6\text{HIO}_3 + 10\text{NO}_2 + 2\text{H}_2\text{O}$
102. $2\text{C}_6\text{H}_6 + 15\text{O}_2 \rightarrow 12\text{CO}_2 + 6\text{H}_2\text{O}$
103. $\text{C}_2\text{H}_5\text{OH} + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 3\text{H}_2\text{O}$
104. $12\text{HClO}_4 + \text{P}_4\text{O}_{10} \rightarrow 4\text{H}_3\text{PO}_4 + 6\text{Cl}_2\text{O}_7$
105. $3\text{BaCl}_2 + \text{Al}_2(\text{SO}_4)_3 \rightarrow 3\text{BaSO}_4 + 2\text{AlCl}_3$
106. $(\text{NH}_4)_2\text{Cr}_2\text{O}_7 \rightarrow \text{Cr}_2\text{O}_3 + \text{N}_2 + 4\text{H}_2\text{O}$
107. $2\text{NaHCO}_3 \rightarrow \text{Na}_2\text{CO}_3 + \text{CO}_2 + \text{H}_2\text{O}$
108. $\text{Fe}_2(\text{C}_2\text{O}_4)_3 \rightarrow 2\text{FeC}_2\text{O}_4 + 2\text{CO}_2$
109. $\text{Ca}_3\text{P}_2 + 6\text{H}_2\text{O} \rightarrow 3\text{Ca}(\text{OH})_2 + 2\text{PH}_3$
110. $2\text{As} + 6\text{NaOH} \rightarrow 2\text{Na}_3\text{AsO}_3 + 3\text{H}_2$